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Influence of serum testosterone on start performance and lean mass accrual in male skeleton athletes

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Within-athlete variation in circulating testosterone has been associated with changes in strength-power performance across a training season (Crewther and Cook, 2010, *Journal of Sports Medicine and Physical Fitness*, 50, 371-375). Accordingly, testosterone could conceivably be implicated in long-term adaptation by regulating training performance via non-genomic pathways, and not simply through genomic processes (Crewther et al., 2011, *Sports Medicine*, 41, 103-123). We investigated the association between serum testosterone and both start performance changes and lean mass accrual across a training season in male skeleton athletes. Ethical approval was obtained from a local university ethics committee. Multiple (seven to nine) dry-land push-track testing sessions were undertaken by seven male skeleton athletes across two 24-week training seasons. Fingertip blood samples taken immediately before testing were used to determine serum testosterone concentration at each session. Subsequently, athletes performed three maximal-effort push-starts and average start performance (15-m sled velocity) was calculated. Within-athlete relationships between testosterone and start performance were firstly explored using Pearson correlations and 90% confidence intervals (CI). Individual coefficients were then combined via Fisher transformation to obtain a group correlation coefficient. Lean mass was estimated using dual-energy X-ray absorptiometry at the beginning and end of one 24-week training season only. Associations between lean mass accrual and several testosterone variables across this period (baseline testosterone, mean testosterone and mean testosterone relative to baseline) were then assessed using Pearson correlations and 90% CI. Combined within-athlete correlations revealed clear positive relationships between serum testosterone and start performance ($r = 0.27$, 90% CI = -0.01 to 0.51). Lean mass change across the training season had a negative association with baseline testosterone ($r = -0.70$, 90% CI = -0.93 to -0.04) and an unclear association with mean testosterone ($r = -0.33$, 90% CI = -0.84 to 0.40). However, a positive relationship between mean testosterone relative to baseline and lean mass accrual was observed ($r = 0.81$, 90% CI

= 0.30 to 0.96). The results suggest that fluctuations in normal baseline testosterone concentration could influence the expression of start performance. Additionally, maintaining an elevated concentration of testosterone above baseline could potentially be important for lean mass gain, perhaps by regulating training performance across a season. These findings provide some support for the short-term effects of testosterone and the inclusion of hormonal analyses in longitudinal athlete monitoring programmes. Although more work is certainly required, training or warm-up interventions which elevate circulating testosterone could potentially be beneficial to skeleton athletes' performances.